

to winds blowing from their direction; it is quite possible that the primary infection came from them.

Number of trees in the plot	399
Blighted trees counted in the fall of 1927	110 or 27.6%
" " " " " spring of 1928	166 or 41.6%
" " " " " " " " 1929	237 or 59.4%

Limited as the observations are the conclusion is inescapable that the occurrence of Phacidium Blight in a young plantation is occasion for concern. Unquestionably its control in some plantations at least is imperative.

2. CONTROL OF THE DISEASE

We have now had sufficient experience with Phacidium Blight in nurseries to know that control through dormant lime sulphur applied in the late fall is highly effective and entirely practical. We are not quite as far on with the problem in plantations, but some careful experimentation has been carried out, and the point has been about reached where we can speak with reasonable confidence of a successful issue. Attention was centered first on the nurseries, partly because control there was essential to their being, but partly because the elimination and prevention of blight in nurseries are fundamentally important for the plantations dependent on them for their stock.

Towards the solution of the problem European practice has had nothing to offer. Phacidium Blight is common and widespread in Scandinavia, Finland and Russia on Scots Pine (no other hosts are reported from Europe), and it is said to cause considerable losses in natural reproduction and in plantations. But so far European pathologists have made little progress towards effecting its control. On this side, insistence on finding a solution to the problem has largely come from the Forestry Department of the Laurentide Division of the Canada Power and Paper Corporation, and no inconsiderable share of whatever advance may have been made is due to the active backing and co-operation of the staff of that Department and their Chief, Mr. Ellwood Wilson. But before reviewing our experiments and observations brief reference should be made to two factors pertinent in a more general way to the subject of control, but none the less deeply significant, namely, heredity and climate.

The question has been repeatedly raised as to the rôle of heredity in control. The answer is two-sided, with the host on one side and the parasite on the other. It is a fact that species and genera of conifers do exhibit differences in inherent susceptibility towards Phacidium Blight, and some of them are practically immune. It is also true that there are indubitable biological strains or physiological species of *Phacidium infestans*, and these exhibit marked preferences in specific choice of hosts. Manifestly these are matters of great practical interest in dealing with

the blight; they will be discussed at another time. There is still another point. On the basis of our general knowledge of infectious diseases it is reasonable to assume that individual plants of White Spruce or other coniferous species are not equally susceptible to the blight fungus, of whatever strain; and there may yet be found some that are immune. But up to the present none of the latter have been recognized, and there are no known exact observations pertaining to the former. The establishment of immunity is an ideal consummation in combating infectious diseases, and presumably in this instance control might be possible by breeding for immunity. But certainly at this stage it would be fantastic to offer such a suggestion as a practical undertaking.

While the incidence of Phacidium Blight is primarily linked with the inherent susceptibility of the host species to the blight fungus, it is also very closely dependent on the environmental factor of climate. This becomes self-evident when it is recalled that the conditions essential to the development of the disease are, in addition to a certain dormancy of the host tissues, a high concentration of moisture in the atmosphere surrounding the foliage and temperatures at which the fungus will grow. These conditions are met in regions in which there is a continuous snow-cover throughout the winter and a prevalence of bright sunshine during the thawing period in the spring. With or without snow, where such conditions do not occur there is little likelihood of trouble from Phacidium Blight. There are still no doubt other factors that have a bearing on the occurrence of Phacidium Blight, and a knowledge of these might be helpful in tree growing or forest management and would throw light on the phenomena of its distribution with reference to the conifers in our native forests. But profitable discussion awaits the gathering of more data; so without further comment we pass directly to the subject of artificial control in plantations.

(a) *Prevention by use of stock from a healthy nursery*

Where Spruce trees are to be planted in regions in which there is a snow-cover throughout the winter it is fundamentally important that they be free from Phacidium Blight when they come from the nursery. The only way to be sure is to know that there is none of the disease in the nursery. Given clean stock to begin with, little or no trouble is likely to be experienced in the plantation.

(b) *Control by excision of branches with blighted needles*

An experiment to discover what control could be attained by the removal of blighted branches from diseased trees was begun in the fall of 1927. Twenty-five suitable trees were numbered and their blighted branches were cut off and burned. They were examined in the spring of 1928, and again in May, 1929. Up to the present nineteen out of the twenty-five have remained free of the disease; six have shown a continu-